

Motorola

HOME RADIO

MODELS

54L1 54L4
54L2 54L5
54L3 54L6

CHASSIS

HS-414

S E R V I C E M A N U A L

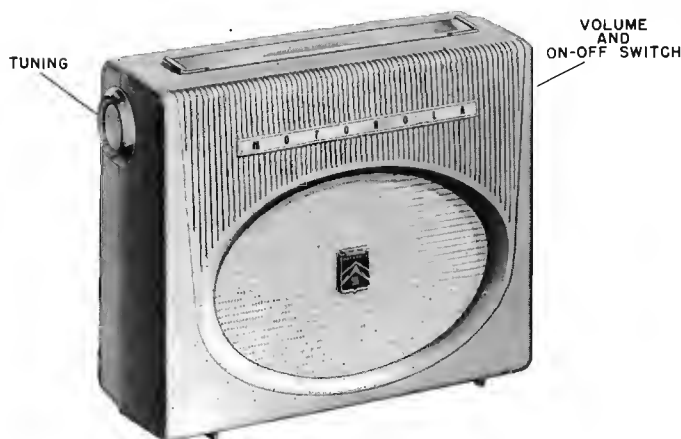
GENERAL INFORMATION

TYPE - Three-power (AC/DC-battery) portable radio receiver. One miniature type tube, three subminiature type tubes and a selenium rectifier are used in a superheterodyne circuit.

RECEIVER MODELS - Model	Color of Cabinet
54L1	Dove Gray
54L2	Leaf Green
54L3	Cherry Red
54L4	Mocha
54L5	Clover Pink
54L6	Azure Blue

TUBE COMPLEMENT - Type	Function
1V6	Converter
1AH4	IF Amplifier
1AJ5	Det, AVC & 1st AF Amp
3S4	Power Amplifier
Rectifier	Selenium type -for AC/DC operation

TUNING RANGE - 535 to 1620 Kc **IF** - 455 Kc



POWER SUPPLY - Operates from 117V AC/DC (15 watts) or from following batteries:
Two 1-1/2V "A" batteries
Eveready No. 950, Burgess No. 2, or equivalent

One 67-1/2V "B" battery
Eveready No. 477, Burgess No. P45, or equivalent

OPERATING INSTRUCTIONS

TO OPEN BACK COVER. With the fingers, grasp back cover at top and pull open. When closing the cover, be careful not to pinch the power line cord or other leads between the cover and the cabinet.

HOUSE CURRENT OPERATION. The power cord is located inside the cabinet and can be reached by opening the back cover. Pass the cord through the slot on the side of the receiver before closing the cover. Cover must be closed or receiver will not operate. (A safety interlock switch turns the current off whenever the back cover is opened.) Plug the cord into any 117 volt AC or DC power outlet. Reverse the plug in the outlet if the receiver does not operate from DC power. When operating from AC, reception may sometimes be improved by reversing the power plug in the outlet. It is not necessary that batteries be installed if the receiver is to be operated only from house power lines.

BATTERY OPERATION. Open the back cover and install the batteries by following the instructions on the label located inside the cover, or refer to Figure 4. Plug the power

line cord into the receptacle on the chassis, or the receiver will not operate from batteries. If the radio is to be operated for a long period of time from house power lines, or is to be placed in storage, remove the batteries and keep them in a cool place. **IMPORTANT:** Never leave low or run-down batteries in the receiver, as they will swell or leak and damage the set.

ANTENNA. A Ferrite Magnetic Iron Core Antenna is built into this receiver. Because of the slightly directional characteristics of the built-in antenna, reception from some stations may be improved by rotating the receiver. In extremely noisy locations, rotate the set until minimum noise and maximum signal pick-up are obtained.

BATTERY REPLACEMENT. Replace the battery pack when low volume or fuzzy tone is noticed. Complete battery replacement instructions will be found inside the back cover, or refer to Figure 4. Normally, the 67-1/2 volt "B" battery will last for 3 or 4 changes of the "A" batteries. **NOTE:** The condition of the batteries will not affect operation of the receiver from the house power lines.

LIST APPLICABLE BULLETINS & SUPPLEMENTS HERE:

MOTOROLA, INC. 4545 AUGUSTA BLVD. CHICAGO 51, ILLINOIS

Part No. 68P632336

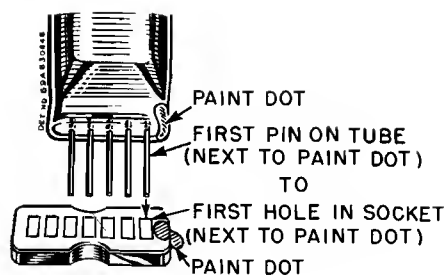
Price 10 Cents

Printed in U.S.A.

TUBE REPLACEMENT

Insert 7-pin subminiature tubes into socket so paint dot on tube corresponds with paint dot on chassis. Tubes with less than 7 pins are inserted in their sockets so the first pin on tube (next to paint dot) enters first hole in socket (next to paint dot). See Figure 1.

FIGURE 1. SUBMINIATURE TUBE INSERTION →



SERVICE NOTES

CIRCUIT DESCRIPTION

1. The circuit of this chassis is conventional - there are no built-in resistors or capacitors. Leads are plated on both sides of the chassis base, thereby replacing the usual connecting wires and making wiring more uniform.
2. The metal plating extends through all the holes on the chassis, connecting circuits on the front with those on the rear.
3. Reference to the schematic diagram and to chassis will permit the circuit to be traced easily.

SAFETY PRECAUTIONS

1. The chassis of this receiver is connected directly to the power line, however, the power circuit is broken by an interlock when the cabinet back is opened. When aligning or servicing the chassis from AC, an isolation transformer should be inserted between the power line and the chassis. If an isolation transformer is not available, check the AC voltage between the chassis and bench ground; if there is any indication of voltage, reverse the line plug before handling the set. If operated from power line, while chassis is out of cabinet, it will be necessary to TEMPORARILY place jumpers across the interlock switch before power can be applied. Jumpers are not required if battery power is used.
2. Do not service the chassis on a metal plate because of the possibility of a short circuit.
3. Use caution when handling the chassis with power applied because all high voltage leads are exposed.
4. The outer edges of the chassis and various plated areas are at ground potential.

COMPONENT REPLACEMENT

1. To prevent tube breakage, remove them before replacing components. **CAUTION: Remove the tubes only by pulling them straight out. Wiggling a tube may bend a socket clip, causing poor contact with the tube pin.**
2. WHEN REMOVING DEFECTIVE COMPONENTS, USE ONLY A SMALL SOLDERING IRON (60 WATTS OR LESS) TO AVOID DAMAGE TO THE WIRING. DO NOT USE A SOLDERING GUN. WARNING: THE LEADS ARE VERY THIN, AND EXCESSIVE HEAT WILL BURN THEM OR LOOSEN THEM FROM THE BASE MATERIAL.
3. Plated connections or leads, if damaged, may be replaced with a jumper or regular hookup wire.
4. It is recommended that IF transformers, tuning capacitor, the volume control, oscillator coil, electrolytic capacitor, or the AC/DC-battery selector switch be removed by immersing all the lugs simultaneously into a small soldering pot. The component may then be lifted off the chassis easily. If a soldering pot is not available, heat each lug individually with a small soldering iron and shake off as much molten solder as possible. Then, by alternately heating and loosening each lug, the entire component will be freed. The disadvantage of using a soldering iron instead of a soldering pot is that the plated connections may be pulled loose from the chassis.
5. Resistors or capacitors may be removed by unsoldering one end at a time.

CAUTION: Clean all the solder from the holes before installing a new component. Do not let the solder run onto an adjacent lead, as a short circuit will be created.

ALIGNMENT

NOTE: The receiver may be operated either from batteries or from the power line during alignment. If AC power is used, it is recommended that an isolation transformer be placed between the power line and the receiver to avoid hum and electrical shock. If an isolation transformer is not available, connect the low side of the signal generator to chassis through a .1 mf capacitor.

1. Remove chassis from cabinet. If operated from power line during alignment, it will be necessary to TEMPORARILY place jumpers across interlock switch before power can be applied. Jumpers are not required if battery power is used.
2. Connect a low range output meter across the speaker voice coil.

3. Connect the low side of the signal generator through a .1 mf capacitor to chassis.
4. Set the signal generator for 400 cycle, 30% modulation.
5. Turn the receiver volume control to maximum.
6. Use a small fibre screwdriver for aligning the IF transformers.
7. Adjust the signal generator output to produce .40 volts (.05 watts) across the voice coil. As stages are aligned, reduce the generator output (not receiver volume control) to maintain the .40 volt level to avoid overloading the receiver.
8. See Figure 2 for adjustment locations and the following chart for procedure.

ALIGNMENT CHART

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT 1.	.1 mf	Grid of conv. (rear stator on gang)	455 Kc	Fully open	1, 2 & 3 (IF cores)	Adjust for maximum.
RF ALIGNMENT 2.	.1 mf	Grid of conv. (rear stator on gang)	1620 Kc	Fully open	4 (Osc trimmer)	Adjust for maximum.
3.		Radiation loop*	1400 Kc	Tune for max	5 (Ant trim)	Adjust for maximum.

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

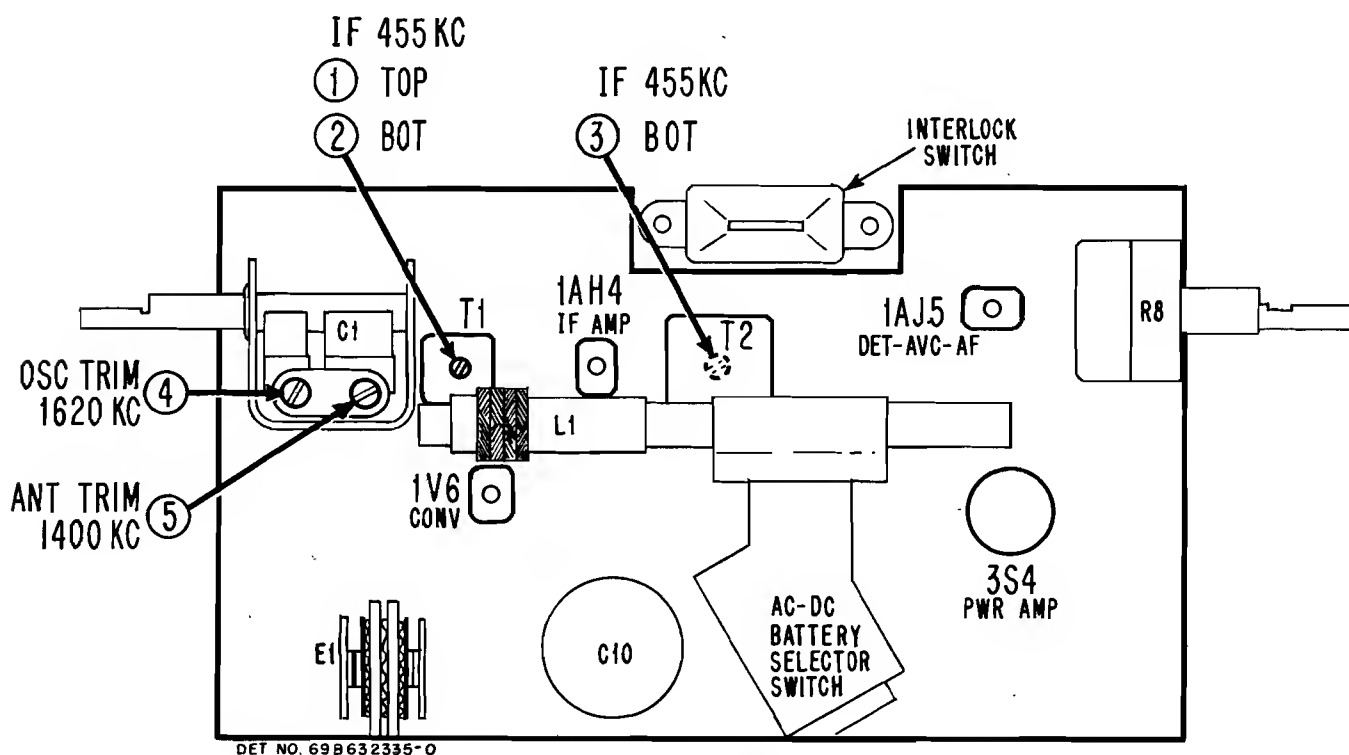


FIGURE 2. TUBE AND TRIMMER LOCATIONS

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

Ref. No.	Part Number	Description	List Price	Ref. No.	Part Number	Description	List Price
CHASSIS PARTS - ELECTRICAL				C-5	21R120853	Cer Disc: 10,000 mmf 450V..	.25
Capacitors (Cer = Ceramic)				C-6	21R120853	Cer Disc: 10,000 mmf 450V..	.25
C-1	19B631121	Variable: 2-gang.....	2.60	C-8	21R121165	Cer Disc: 5000 mmf 500V....	.25
C-2	8A120842	Paper: .05 mf 200V.....	.25	C-9	8A120842	Paper: .05 mf 200V.....	.25
C-3	21R120562	Cer Disc: 10 mmf 500V.....	.25	C-10,			
C-4	21R120545	Cer Disc: 5.6 mmf 500V.....	.25	A,B,C	23B631123	Electrolytic: 40-40 mf/150V; 250 mf/10V.....	2.55

Ref. No.	Part Number	Description	List Price	Part Number	Description	List Price
C-11	8K121268	Paper: .05 mf 400V.....	.25	7A631211	Bracket, handle mtg.....	.20
C-12	21R120853	Cer Disc: 10,000 mmf 450V..	.25	15E631471	Cabinet, front section: dove gray; less handle, grille and nameplate (54L1).....	4.35
C-13	21R120853	Cer Disc: 10,000 mmf 450V..	.25	15K631577	Cabinet, front section: leaf green; less handle, grille and nameplate (54L2).....	4.35
CR-1	21B631414	Multiple Capacitor-Resistor Plate.....	1.30	15K631578	Cabinet, front section: cherry red; less handle, grille and nameplate (54L3).....	4.35
E-1	48B631295	Selenium Rectifier: half-wave; 65 ma.....	1.80	15K631579	Cabinet, front section: mocha; less handle, grille and nameplate (54L4).....	4.35
L-1	24B630365	Antenna Loop: with core....	2.00	15K631801	Cabinet, front section: clover pink; less handle, grille and nameplate (54L5).....	4.35
L-2	24B631102	Oscillator Coil.....	.80	15K631802	Cabinet, front section: azure blue; less handle, grille and nameplate (54L6).....	4.35
LS-1	50C631209	Speaker: 4" x 6" PM; 3.2 ohm VC; incl output trans..	5.85* exch 4.40	55A621675	Catch, rear cover (on cabinet front section).....	.05
Resistors Note: All resistors are insulated carbon type unless otherwise specified.				42A72609	Clip, "A" battery retainer (on rear cover).....	.05
R-1	6K121278	3.3 meg 10% 1/2W.....doz	1.20	42A631105	Clip, chassis retaining.....doz	.30
R-2	6K121279	470,000 10% 1/2W.....doz	1.20	42A631213	Clip, handle mtg.....	.10
R-3	6K121301	1000 10% 1/2W.....doz	1.20	35A632223	Cloth, grille.....	.10
R-4	6K121300	27,000 10% 1/2W.....doz	1.20	1V631170	Cord, cover stop: complete.....	.10
R-5	6K121277	4.7 meg 10% 1/2W.....doz	1.20	15E631473	Cover, cabinet rear: dove gray (54L1).....	3.95
R-6	6K121299	47,000 10% 1/2W.....doz	1.20	15K631580	Cover, cabinet rear: leaf green (54L2).....	3.95
R-7	6K119936	1 meg 10% 1/2W.....doz	1.20	15K631581	Cover, cabinet rear: cherry red (54L3).....	3.95
R-8	18B631293	Volume Control: 1 meg; with switch.....	1.80	15K631582	Cover, cabinet rear: mocha (54L4)	3.95
R-9	6K121303	270 10% 1/2W.....doz	1.20	15K631803	Cover, cabinet rear: clover pink (54L5).....	3.95
R-10	6K121304	33 10% 1/2W.....doz	1.20	15K631804	Cover, cabinet rear: azure blue (54L6).....	3.95
R-11	6K121303	270 10% 1/2W.....doz	1.20	13K631995	Grille, speaker: gold (54L1,3 & 6).....	1.75
R-12	6K121301	1000 10% 1/2W.....doz	1.20	13C631216	Grille, speaker: silver (54L2 & 5).....	1.75
R-13	6K121303	270 10% 1/2W.....doz	1.20	13K631996	Grille, speaker: copper (54L4)...	1.75
R-14	6K121744	680 10% 1/2W.....doz	1.20	55B631215	Handle, carrying: gray.....	.55
R-15	17A631294	Wire Wound: 2000 10W.....	.80	1V631167	Knob, tuning: gray; includes retaining spring.....	.30
R-16	6K119926	2700 10% 1/2W.....doz	1.20	1V631168	Knob, volume: gray; includes retaining spring.....	.30
R-17	65A631725	Special Fuse: 150.....	.35	13K630096	Medallion, Motorola insignia: gold (54L1,3 & 6).....	.25
S-1	40B631101	Rotary Switch: 6PDT (AC/DC-bat).....	1.45	13K731365	Medallion, Motorola insignia: silver (54L2,4 & 5).....	.25
S-2	40A621656	Slide Switch (safety interlock).....	.65	33B631819	Nameplate, Motorola.....	.25
T-1	24C631119	IF Transformer: 455 Kc.....	1.55	3S121330	Screw, machine: 6-32 x 3/8; Phillips oval head; chrome pl.do	.30
T-2	24C631118	IF Transformer: 455 Kc.....	1.45	26A621557	Shield, interlock switch.....	.30
T-3	25B631208	Output Transformer.....	1.65	42K632221	Spring, cover latch (on rear cover).....doz	.50
Part Number Description List Price				22A631106	Spring, hinge: left.....	.05
CHASSIS PARTS - MECHANICAL				22A631107	Spring, hinge: right.....	.05
42A631104	Clip, "A" battery contact.....doz	.50		41A621537	Spring, knob retaining.....	.05
42B610632	Clip, tube pin.....per/c	.50		4K631458	Washer, fibre (line cord retaining).....doz	.30
30A470651	Cord, line: with plug.....	.75		4K631476	Washer, fibre (chassis mtg)....doz	.20
29A630183	Lug, terminal (lead connections to plated chassis).....doz	.35		4K632222	Washer, fibre (on control knobs).....doz	.35
1A631131	Socket, tube: subminiature; 7-prong.....	.35		4A631115	Washer, hinge mtg: cad pl.....doz	.20
41K680029	Spring, "A" battery contact....doz	.20		4K631108	Washer, fibre: line cord strain relief.....doz	.30
31K631122	Strip, "B" battery terminal: with leads.....	.30				
CABINET PARTS						
45A621616	Arm, interlock switch actuating (or rear cover).....	.10				

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

*Plus Federal Excise Tax At Current Rate

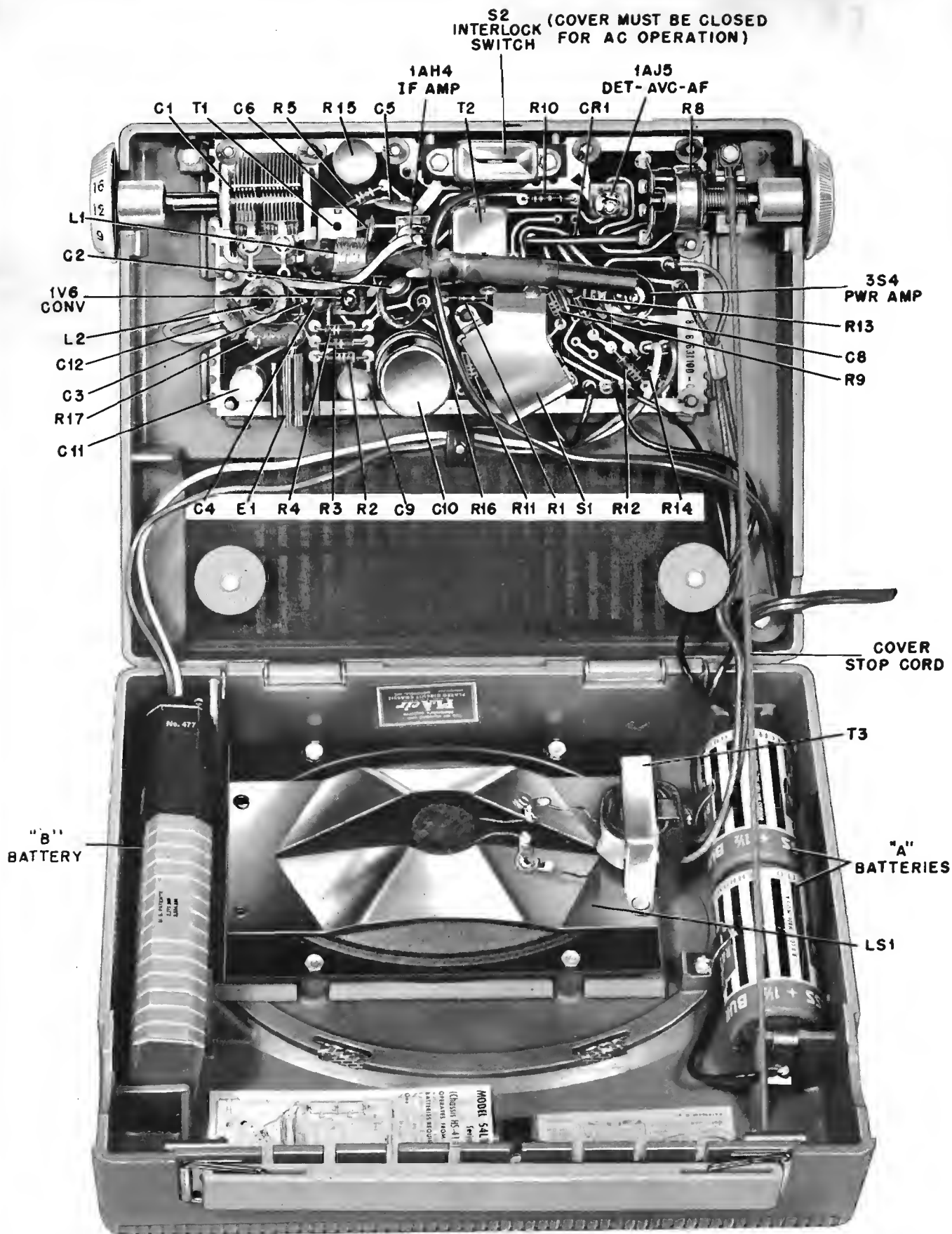


FIGURE 4. PARTS LOCATIONS